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Two new species of *Armascirus* (Acari: Prostigmata: Cunaxidae) from Slovakia

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Abstract

Two new mite species from Central Europe, viz. *Armascirus fendai* **sp. nov.** and *Armascirus masani* **sp. nov.** (Acari: Prostigmata, Cunaxidae) are described and figured. The keys to the known species (females and males) of the genus *Armascirus* are given.

Key words: Acari, *Armascirus*, Cunaxinae, key, taxonomy

Introduction

Cunaxidae are a family of small predatory mites. The genus *Armascirus* was erected by Den Heyer (1978), who also gave a new classification system and examined the systematics of the family Cunaxidae (Den Heyer 1980, 1981). Later, the monograph of Smiley (1992) presented more detailed knowledge, including a new classification and more new taxa. Since then new cunaxid species have been described from Asia (Muhammad & Chaudhri 1991; Bashir & Afzal 2005; Bashir et al. 2008; Corpuz-Raros 1995, 2008; Corpuz-Raros & Gruezo 2007) and Europe (Kalúz 2009). Most significantly for *Armascirus*, several new species of this genus were described from the Neotropical region (Den Heyer & Castro 2008a, 2008b, 2012) and several species previously placed in other genera (Chaudhri 1977, 1980; Michocka 1982) were moved into *Armascirus* (Den Heyer & Castro 2008b). Recently, Skvarla & Dowling (2011) brought together the knowledge on this genus and, with along with a new species description, presented a key to adults of *Armascirus* of the world. *Armascirus* now comprises 36 species, plus an additional two new species described in this manuscript.

Material and methods

The specimens studied were collected from soil samples (soil with rhizosphaera of grass) in various areas of Slovakia, isolated in Tullgren photoeclectors and mounted in Swann´s medium. The drawings were produced with the light microscopy and then enhanced with computer software. All measurements (stated in micrometers—µm) were done by standardized microscopy ocular micrometer. Measurements are presented as the measurement of the holotype followed by the range (or single measurement for *A. masani* **sp. nov.**) of paratype dimensions in parentheses. Body length was measured from the anterior margin of the pronotal dorsal shield to the caudal margin of the opisthosoma and the width just behind the posterior margin of pronotal shield. The leg segments were measured as follows: coxa—in the axis vertical to connection line of coxa and trochanter; in other leg segments the length of their dorsal side. The dorsal setal notation follows the more generally accepted nomenclature of Kethley (1990), used by Sionti & Papadoulis (2003a,b), Den Heyer (2006) and the later changes suggested for the Bdelloidea by Den Heyer & Castro (2008a). The scales in all figures represent 100 µm.

Abbreviations: Bf—basifemur, Tf—telofemur, Ge—genu, Ti—tibia, Ta—tarsus, Tita—palp tibiotarsus, ap—apophysis, spls—spine-like seta, fam—famulus; asl—attenuate solenidion, bsl—blunt-ended solenidion, tsl—terminal solenidion, sts—simple tactile seta; mst—microseta; T—smooth trichobothrium.

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Genus *Armascirus* Den Heyer, 1978

The main features separating the genus *Armascirus* from the other genera of the subfamily Cunaxinae (Den Heyer 1978) are: palpal segment II (basifemur) with a simple dorsal seta; palpal segment III (telofemur) with a spine-like dorsal seta; apophysis present on palpal segment IV (genu); the female palp with a median spine-like apophysis on segment III, which is lacking in the males. Dorsal plates reticulated, the dorsal chaetotaxy includes two pairs of fine setose trichobothria (***vi*** and ***sce***), with the posterior pair (***sce***) the longest, six pairs of tactile setae in dorso-central and three pairs of dorso-lateral series. Anal region with a pair of anal setae and two pairs of para-anal setae. Chaetotaxy of telofemora I–IV: 4 sts (simple tactile setae)-4 sts-3 sts, 1 ms (microseta)—3 sts, 1 ms. The proximal sensory complex on dorsal aspect of tarsus I with famulus (fam). The chaetotaxy of telofemora I–IV is 4 sts-4 sts-3 sts, 1 ms—3 sts, 1ms and the chaetotaxy of coxal plates I–IV is 3-1 (or 2 in ♀) or 2 (resp. 1 in ♂)-3-3 sts. More detailed generic features of *Armascirus* are presented in the paper of Skvarla & Dowling (2011).

Armascirus fendai, new species

Differential diagnosis. *Armascirus fendai* **sp. nov.** resembles the species *A. ozarkensis* Skvarla & Dowling, *A. gimpeli* Smiley and *A. cerris* Kalúz by having a small hysterosomal median shield that lacks dorsal setae and has lateral platelets. It can be differentiated from *A. ozarkensis* and *A. gimpeli* by the shorter hysterosomal median shield (width/length=1/1) and by the number of sts on tarsi I–IV (15-12-11-11), from *A. cerris* by the short hysterosomal platelets and by two apophyses on the palpal telofemur. Further differential features are stated in the key.

Description. Female—body length 544 (481–861), width 386 (309–544), 5 specimens measured.

Dorsum (Fig. 1): Propodosoma with a reticulate subrectangular shield, cone–shaped distally. Propodosomal shield reaching to anterior region of hysterosoma, bearing a pair of anterior (***vi***) and posterior (***sce***) setose trichobothria and also 2 pairs of tactile setae (***ve*** and ***sci***). Anterior trichobothrium 239 (239–258), posterior trichobothrium 509 (386–512) long, distance between bases of ***vi–vi*** and ***sce–sce*** 34 (34–37) and 308 (208–308), respectively. Propodosoma separated from hysterosoma by fine striae with broken dash-like papillae. Fine striae between pairs of setae d_1–d_1 and e_1–e_1 anteriorly slightly concave to transverse. Hysterosoma with hysterosomal median shield and a pair of lateral reticulate platelets; 6 pairs of tactile dorsal setae present on hysterosoma; c_2, c_1–h_1. Short setae c_1 and c_2 about equal in length (8-9 μm); following setae longer and increasing in length: d_1 (11), e_1 (18), f_1 (31) and h_1 (41). Distance between bases of setae c_1–c_1 about 16 times length of c_1; d_1–d_1 about 6 times length of d_1; e_1– e_1 about 4 times longer e_1; f_1–f_1, about 2–times length of f_1; h_1–h_1 nearly length of h_1.

Venter (Fig. 2). Coxal plates weakly sclerotized, coxae I–II and III–IV contiguous and finely reticuate, reticulation similar to those of dorsal shields, but three times smaller in diameter. Setal formula of coxae I–IV: 3-2-3-3 sts. Venter of hysterosoma (Fig. 2) with a pair of simple centro-medial setae on striated integument between coxae III. A pair of simple setae laterally between coxae II and III, and with 5 pairs of hysterogastral setae arranged anteriorly to genital plates; 4 pairs of simple setae on weekly sclerotized genital plates, 2 pairs of adanal and a pair of anal setae situated caudally.

Gnathosoma (Fig. 3). Five-segmented palp 409 (309–412) long with palpal tibiotarsus apically curved. Palp with gently punctate surface and bare tibiotarsus. Palpal chaetotaxy as follows: trochanter—bare, basifemur—1 dorso-medial simple seta (8–10) long; inner surface of telofemur with 1 latero-medial apophysis (17–19), 1 ventro-medial apophysis (28–30), dorso-distal stout spine-like seta (14–17); inner surface of genu with 1 long and simple latero-medial seta (29–33 long), 1 elongate ventro-distal apophysis (65-90), genual outer surface ventrally with 1 simple short distal seta (15–20), dorsally with 1 spine-like distal seta (15–19), palpgenual apophysis 6 times long as adjacent spine-like seta; tibiotarsus inner surface with 1 simple proximal seta (14–16) and medially with 1 stout spine-like seta (12–15); outer surface with 1 dorso-medial simple seta (9–12); dorso-distal simple seta (9–10) and terminating with small short claw (9–12).

Chelicera. Slender and 235 (195–239) long, cheliceral segment I as well as proximal part of segment II with randomly placed papillae, a pair of distal setae present.

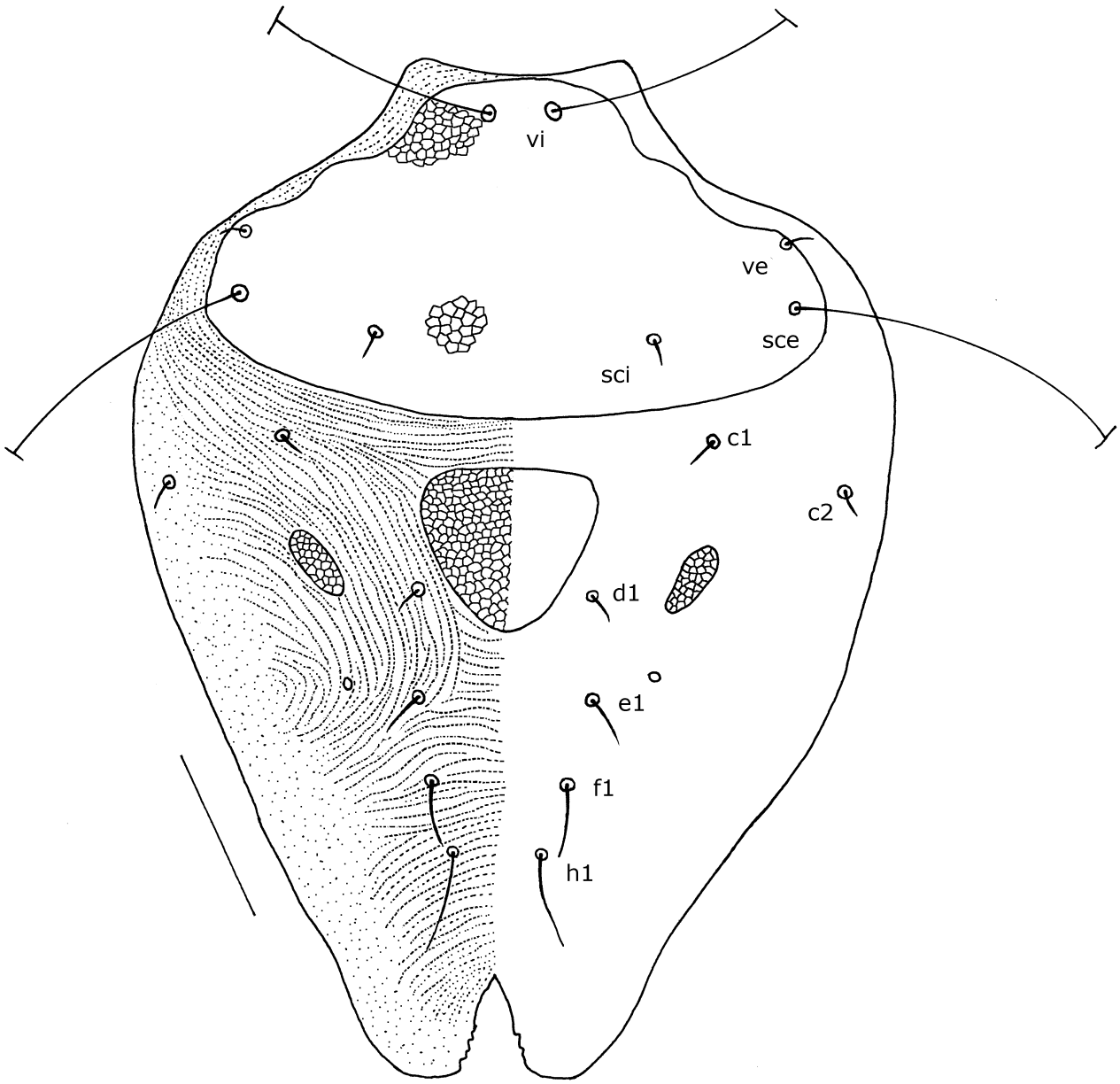

FIGURE 1. *Armascirus fendai* **sp. nov.**—female (idiosoma dorsal). Scale bar = 100 µm.

Subcapitulum (Fig. 3). Subrectangular, distally cone-shaped subcapitulum with 2 pairs of short adoral setae and 4 pairs of hypognathal setae (***hg***). Setae hg_4 (40 long) 2 times longer than hg_2 (21), more than 2 times longer than hg_1 (18) and nearly 3 times longer than hg_3 (15). Coxal region of subcapitulum with randomly placed fine papillae, latero-proximal part finely reticulated.

Legs (Fig. 4). All legs with fine reticulation, most distinct on proximal segments. Legs I–III shorter than leg IV. Chaetotaxy I–IV (excluding coxae) as follows: trochanters I–IV 1-1-2-1 sts; basifemora I–IV 5-5-4-2 sts; telofemora I–IV 4-4-4-4 sts; genu I—2 asl, 1 mst, 6 sts; genu II—1 asl, 6 sts; genu III—6 sts; genu IV—6 sts; tibia I—1 asl, 5 sts; tibia II—1 asl, 5 sts; tibia III—1 bsl, 5 sts; tibia IV, 1 smooth T, 4 sts; tarsus I—1 fam, 1 asl, 1 tsl, 15 stsl; tarsus II—1 bsl, 1 tsl, 12 sts; tarsus III—1 tsl, 11 sts; tarsus IV—11 sts.

Length of leg segments (coxa and trochanter not measured): Basifemur I—109 (92–109), II—100 (98–108), III—123 (97–123), IV—103 (103–138); Telofemur I—68 (68–71), II—61 (53–65), III—53 (46–61), IV—65 (51–65); Genu I—39 (37–45), II—43 (38–45), III—53 (46–53), IV—72 (51–72); Tibia I—51 (40–51), II—42 (36–49), III—72 (57–72), IV—93 (63–93); Tarsus, I—193 (146–204), II—180 (137–181), III—189 (154–204), IV—187 (154–208).

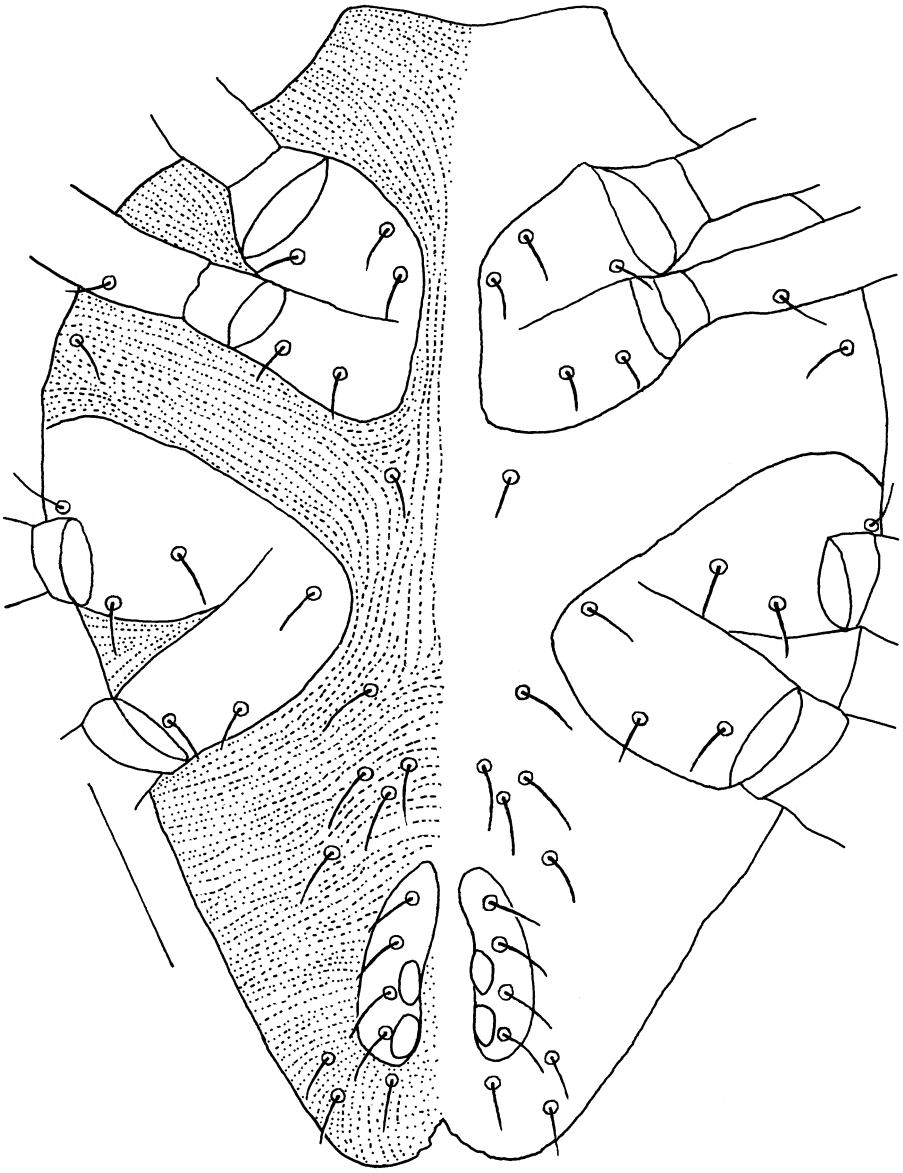

FIGURE 2. *Armascirus fendai* **sp. nov.**—female (idiosoma ventral). Scale bar = 100 µm.

Male and developmental stages. Unknown.

Material studied. Holotype: female on slide, SW—Slovakia, Veľké Leváre village vicinity, Nature Reserve Abrod—*Molinietum caerulae,* 124 m a.s.l. (N-48˚31′57″, E-17˚00′21″), 14. Sept. 1999 from soil with grass roots on sands. Paratypes: 4 females on slides; SW—Slovakia, Bratislava, Podunajské Biskupice (N-48˚05′43″, E-17˚09′44″), Nature reserve Ostrov Kopáč—*Quercetum delechampi*, 130 m a.s.l., 12. June 2006, 1 female from soil with grass roots; N—Slovakia, High Tatras Mts., Vyšné Hágy vicinity (N-49˚07′20″, E-20˚06′32″), 1175 m a.s.l., mountain meadow, 11. July 2008, 1 female collected from soil with grass roots; N—Slovakia, High Tatras Mts., Vyšné Hágy vicinity (N-49˚07′20″, E-20˚06′32″), 1175 m a.s.l., mountain meadow, 4. Sept. 2008, 1 female collected from soil with grass roots; W—Slovakia, Strážovské vrchy Mts., Čierna Lehota village vicinity (N-48˚52′35″, E-18˚20′27″), 486 m a.s.l, 26. May 2011, 1 female from soil with grass roots on limestones. Material collected by S. Kalúz. Holotype and two paratypes will be deposited in Slovak National Museum, Bratislava, Slovakia; one paratype in The Royal Belgian Institute for Natural Sciences, Brussels, Belgium; one paratype in the collection of senior author.

Etymology. The new species is named in honour of Slovak acarologist Dr. Peter Fenďa.

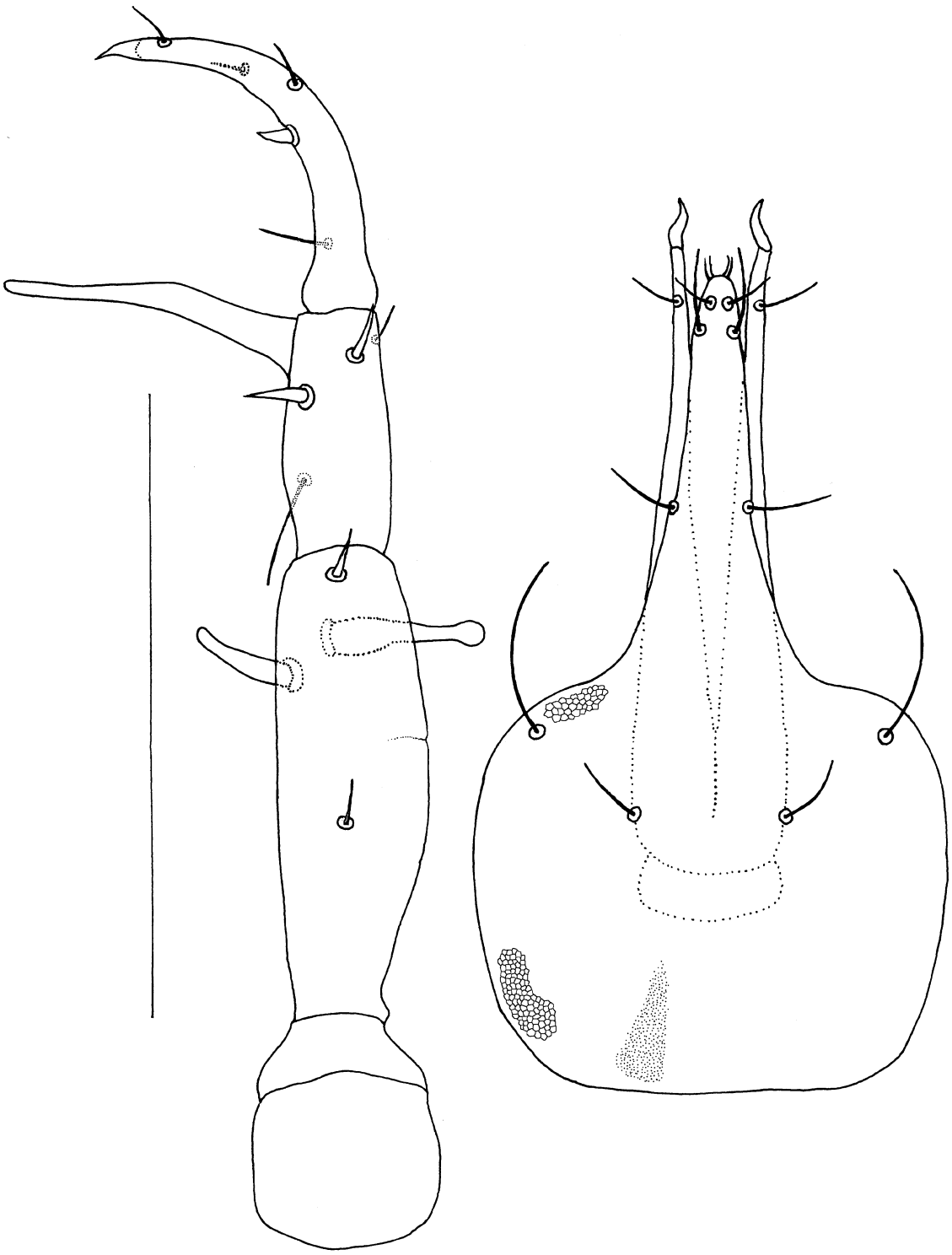

FIGURE 3. *Armascirus fendai* **sp. nov.**—female; palps (dorsal view), subcapitulum (ventral view). Scale bar = 100 µm.

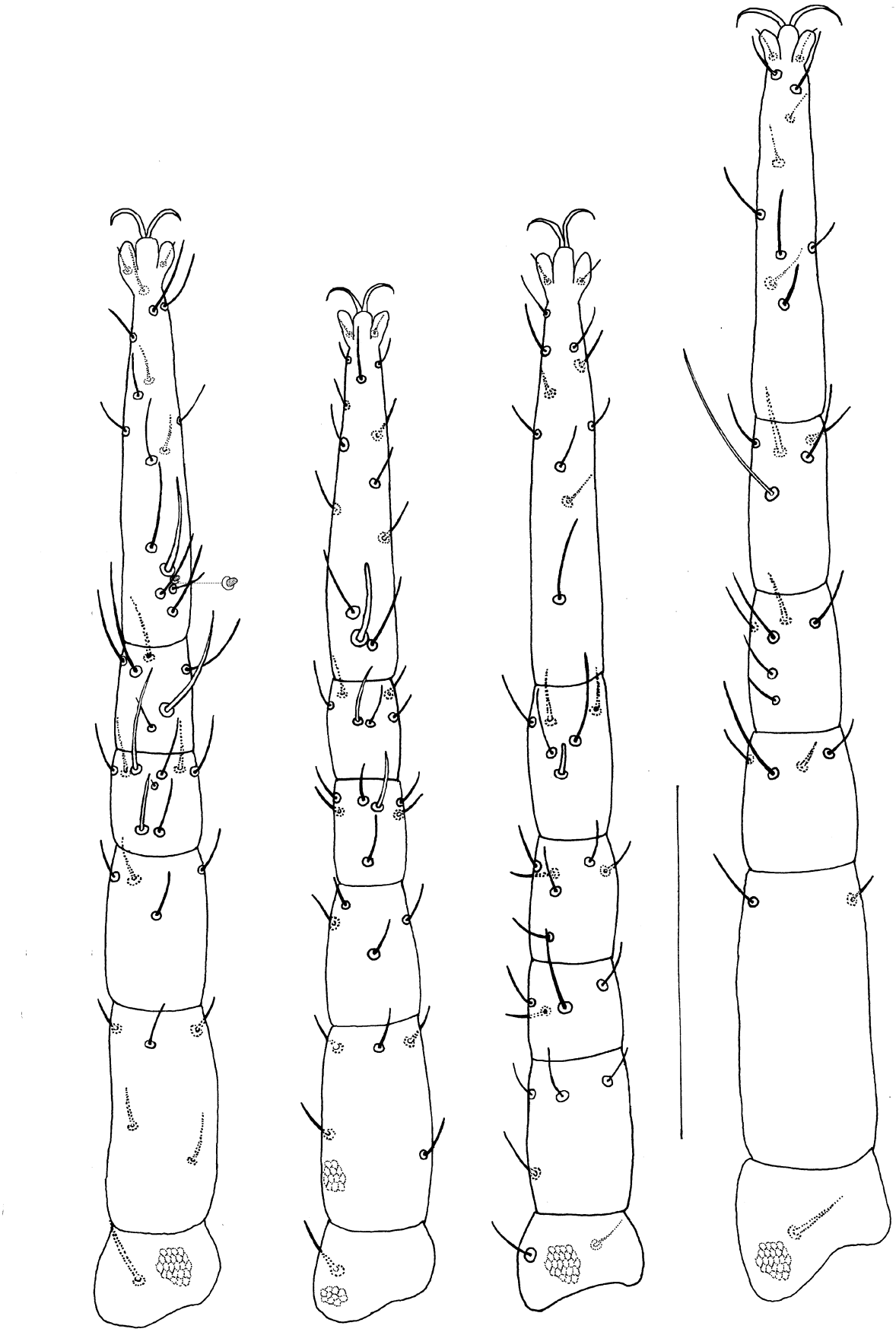

FIGURE 4. *Armascirus fendai* **sp. nov.**—female; legs I–IV (from left, dorsal view). Scale bar = 100 µm.

***Armascirus masani,* new species**

Differential diagnosis (male). This species can be distinguished from the male of the similar species *A. taurus* (Kramer) by having the venter with five simple setae (except for genital, anal and adanal setae) and a shorter distance between the bases of ***sci–sci*** compared to the distance between c_1– c_1, while *A. taurus* has the venter with six simple setae and a longer distance between the bases of ***sci–sci*** compared to distance between c_1– c_1. The other similar species *A. ebrius* Chaudhri and *A. lebowensis* Den Heyer differ from *A. masani* **sp. nov.** by the coxal setal formula I–IV 3-2-3-3 sts and by having different tarsal chaetotaxy I–IV. Two other similar species, *A. limpopoensis* Den Heyer and *A. huyssteeni* Den Heyer, have higher numbers of sts on tarsi I–IV compared to *A. masani* **sp. nov.**

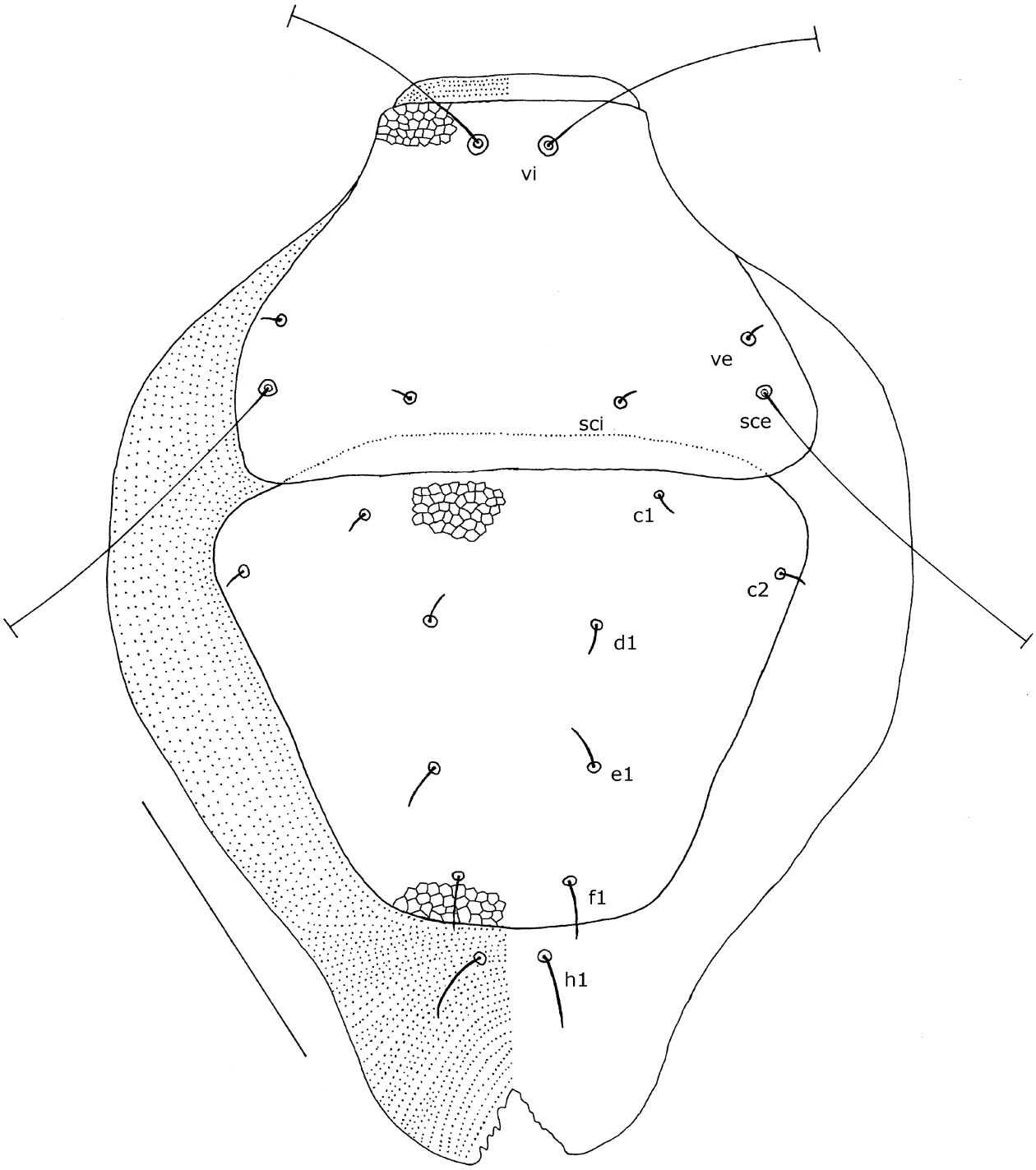

FIGURE 5. *Armascirus masani* **sp. nov.**—male (idiosoma dorsal). Scale bar = 100 µm.

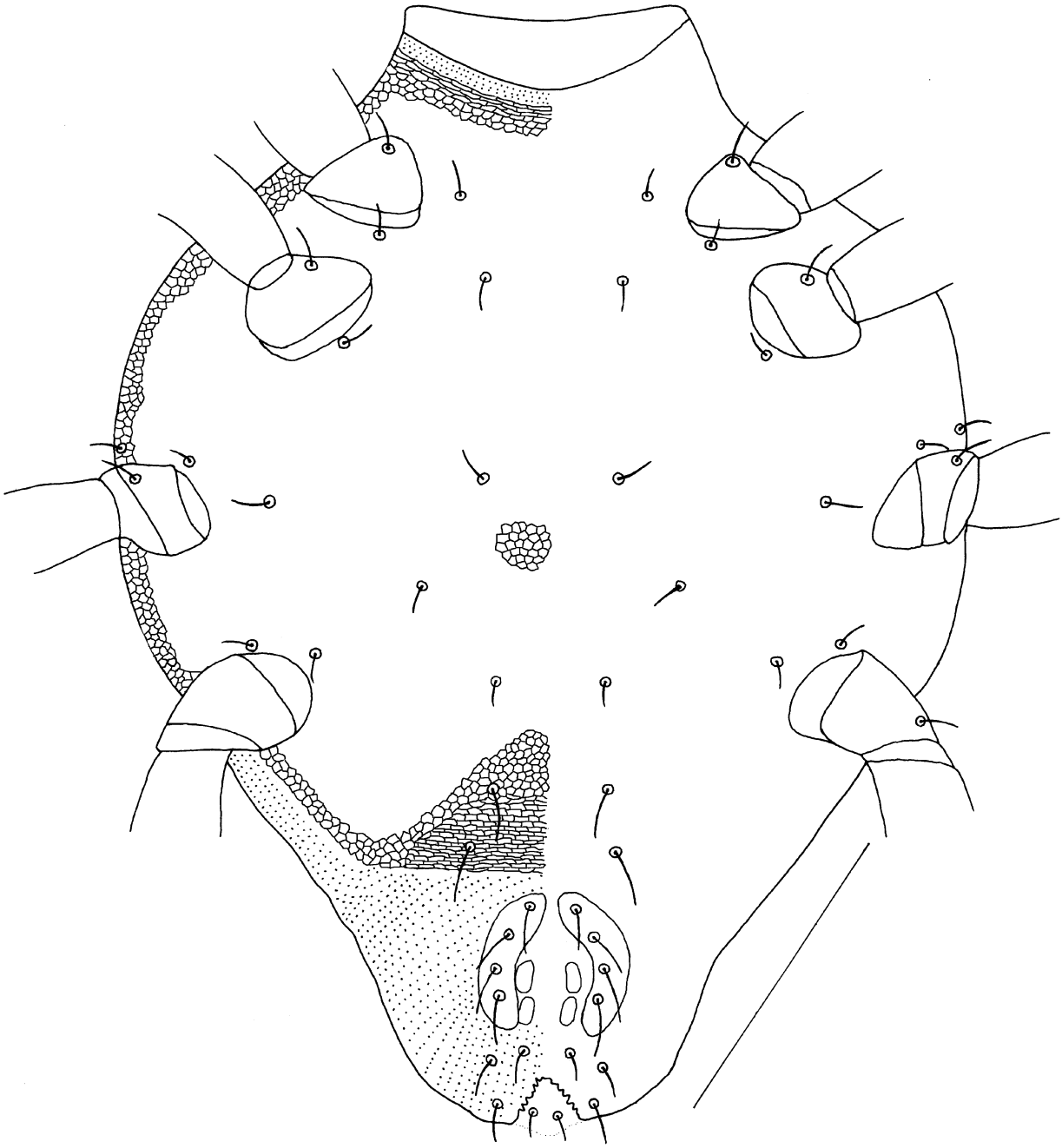

FIGURE 6. *Armascirus masani* **sp. nov.**—male (idiosoma ventral). Scale bar = 100 µm.

Description. Male (holotype and paratype), body length 340, 327 width 262, 239, respectively.

Dorsum (Fig. 5): Propodosoma with distally cone-shaped reticulate shield, a pair of anterior (***vi***) and posterior (***sce***) setose trichobothria and 2 pairs of tactile setae (***ve*** and ***sci***). Separation of propodosoma from hysterosoma not unambiguously visible in specimens studied. Hysterosoma with large reticulate hysterosomal median shield bearing 5 pairs of setae—c_1, c_2, d_1, e_1, f_1. 6 pairs of dorsal setae on hysterosoma; c_1–h_1, c_2; h_1 on soft tegument. Short setae c_1 and c_2 equal in length (9 and 11), d_1 and e_1 longer (12 and 15), respectively), setae f_1 (21) and h_1 (23) 2-times length of c_1. Distance between bases c_1–c_1 (95) about 10-times length of c_1; d_1–d_1 (51–57) about 5-times length of d_1; e_1–e_1 (39–51) about 5-times length of c_1; f_1–f_1 (37–38) about 4-times length of c_1. Distance between bases of f_1–f_1 1.6 longer than h_1–h_1 and distance between bases of setae h_1–h_1 equal to length of h_1. Length:width ratio of hysterosomal median shield is 8:10. Distances between bases of setae (except for c_2–c_2) becoming smaller from c_1–c_1 to h_1–h_1.

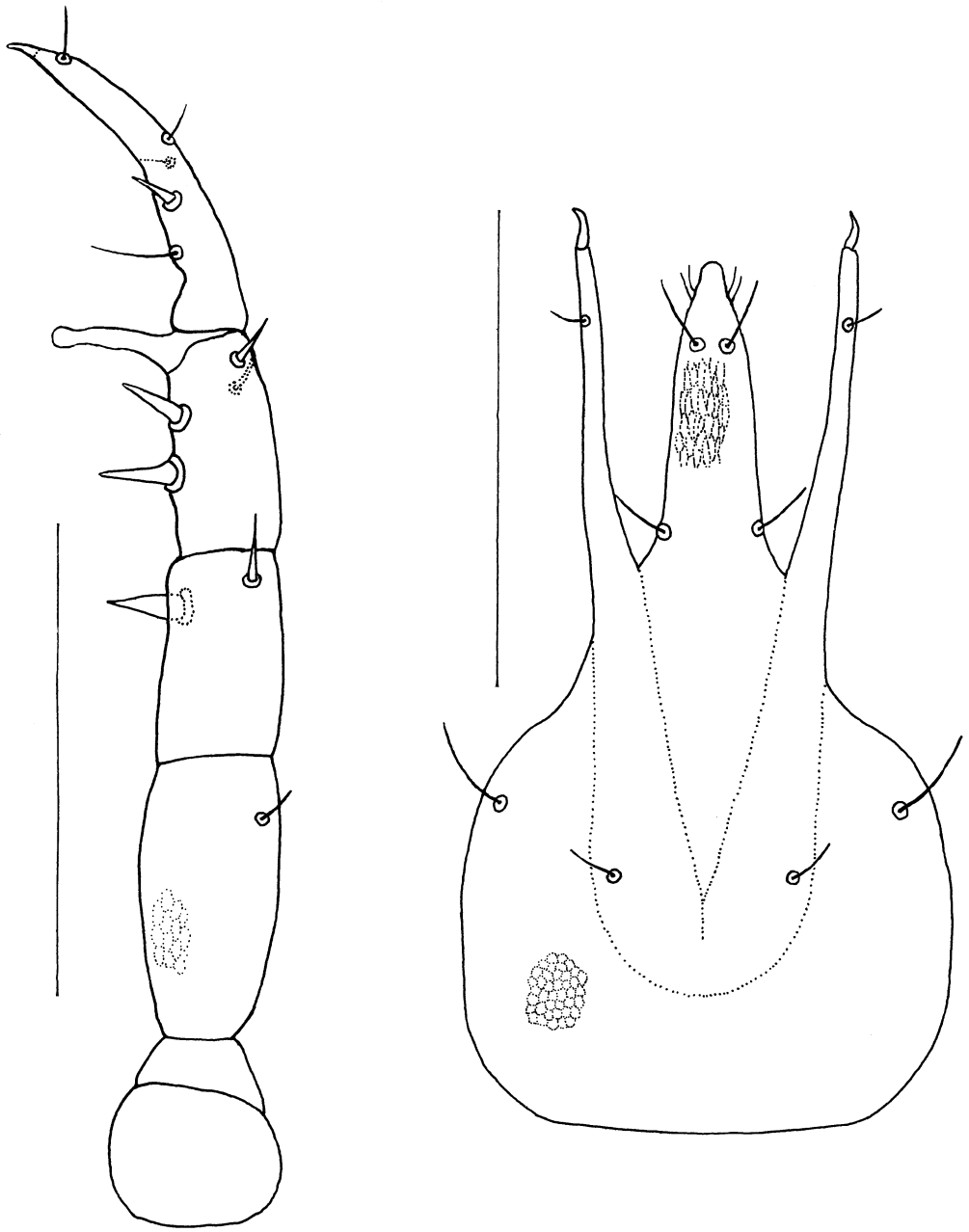

FIGURE 7. *Armascirus masani* **sp. nov.**—male; chelicera (dorsal view), subcapitulum (ventral view). Scale bar = 100 µm.

Venter (Fig. 6). Coxal plates not divided into coxal regions, coxal plates situated in weakly sclerotized and reticulate ventral shield covering a great part of ventral region. Coxae I–IV setal formula: 3-1-3-2. Venter of hysterosoma with 5 pairs of simple setae (not including coxal, genital, anal and para-anal setae) on finely reticulate (reticulation 3-times smaller in diameter than in dorsal shields) contiguous ventral shield. 3 pairs of setae situated between coxae III and IV and 2 pairs of setae and longer para-genital setae arranged anteriorly to genital plates. Reticulation surrounding para-genital setae differs from pattern of prevailing part of ventral shield. Ventral striations with small broken dash-like papillae include hysterolateral, adgenital and adanal region. Each genital valve with 4 genital setae. A pair of anal setae present and also 3 pairs of adanal setae adjacent to anal plate.

Gnathosoma (Fig. 7). Palp (Fig. 7). Palps 5-segmented, 243 and 235 long, with fine reticulate surface (pattern similar to ventral reticulation) and a bare tibiotarsus. Palpal chaetotaxy as follows: trochanter bare, basifemur with 1 dorso-median simple seta (11 long); telofemur inner surface with apical stout spine-like seta (17), dorso-apically with stout spine-like seta (21); inner surface of genu medially with 1 stout spine-like seta (20), 1 stout spine-like seta (15) and 1 elongate apophysis distally (23), dorso-apically with 1 spine-like seta (11) and ventro-apically with 1 simple seta (11–12); tibiotarsus inner surface proximally with 1 long simple seta (15–23) and medially with 1

stout spine-like seta (11); outer surface with 1 ventro-lateral (8) and 1 dorso-lateral simple seta (8); terminating with 1 solenidion (8) (sensu Den Heyer 2006) and a small short claw (3–5). Palpal tibiotarsus nearly straight, apically slightly curved, with proximal inner surface with distinct U-depression.

Chelicera (Fig. 7). Slender, 153 and 146 long, surface with small randomly placed papillae and a pair of short cheliceral setae.

Subcapitulum (Fig. 7). Subrectangular, distally cone-shaped subcapitulum (174 long) bears 2 pairs of short adoral setae and 4 pairs of hypognathal setae (***hg***). Setae hg_3 longest, setae hg_4 shortest. Surface of subcapitulum with reticulate pattern and small randomly placed papillae, pattern between setae hg_1 and hg_2 oblong proximo-distally.

Legs (Fig. 8). Coxal plates not divided into coxal regions, coxal plates situated in weakly sclerotized and reticulate ventral shield. Coxae I–IV setal formula: 3-1-3-2. Each leg with reticulate pattern, legs I–III shorter than leg IV. Chaetotaxy I–IV (excluding coxae) as follows: trochanters I–IV 1-1-2-1 sts; basifemora I–IV 5-5-3-0 sts; telofemora I–IV 4-4-4-4 sts; genu I—2 asl, mst, 5 sts; genu II—1 asl, mst, 5 sts; genu III—1 asl, 6 sts; genu IV—1 asl, 6 sts; tibia I—(2 asl, mst), 4 sts; tibia II—5 sts; tibia III—1 bsl, 5 sts; tibia IV—1 smooth T, 4 sts; tarsus I—(1 fam, 1 asl, 1 sts), 1 tsl, 16 stsl; tarsus II—1 asl, 1 tsl, 13 stsl; tarsus III—1 tsl, 12 sts; tarsus IV—10 sts.

Length of leg segments I–IV of holotype and paratype (excluding coxa and trochanter): Basifemur (74–77)–(66–66)–(66–55)–(74–80)]; Telofemur (46–46)–(42–38)–(38–39)–(42–38); Genu (28–31)–(31–26)–(38–39)–(46–43); Tibia (42–36)–([34–32)–(51–49)–(61–61); Tarsus (138–142)–(121–116)–(131–123)–(131–124), respectively.

Female and developmental stages: Unknown.

Material studied. Holotype: male on slide, N—Slovakia, High Tatras Mts., Nová Polianka village vicinity (N-49˚07′17″, E-20˚09′46″), 1075 m a.s.l., 13. Aug. 2007, mountain meadow, collected from soil with grass roots. Paratype: male on slide, N—Slovakia, High Tatras Mts., Starý Smokovec village env. (N-49˚08′12″, E-20˚11′59″), 1086 m a.s.l., 13. Aug. 2007, mountain meadow, collected from soil with grass roots. Material collected by S. Kalúz. Type material will be deposited in the Slovak National Museum, Bratislava, Slovakia.

Etymology. The new species is named in honour of Slovak acarologist Dr. Peter Mašán.

Remarks. The males of Cunaxidae are rarely found and therefore descriptions are scarce or absent for many genera, including *Armascirus*. Den Heyer (1978) described the females and males of three *Armascirus* species—*A. huyssteeni, A. lebowensis* and *A. limpopoensis* from South Africa—and this work forms the basis for morphological differences between the sexes. The two sexes of *Armascirus* differ mainly on the hysterosomal area and palps: males have a large hysterosomal shield and one palpal telofemoral apophysis, whereas females have a small hysterosomal shield and two palpal telofemoral apophyses. Other differences between the sexes occur in the chaetotaxy of tarsi, tibiae and genua of legs I–III (Den Heyer 1978).

Males and females can thus be difficult to associate. Therefore, the description of males, without the information on relevant females, risks synonymy, especially in species with overlapping zoogeographic distribution. Nevertheless, some features can be linked between the sexes of the same species, and can also differentiate males and females of different species. For example, the ventral idiosomal (excluding coxal, genital, anal and para-anal setae), coxal and basifemoral setae are the same between sexes, so can be used to separate species of different sexes.

A comparison of morphological features in known Slovak *Armascirus* species (females of *A. cyaneus* Kalúz and *A. cerris* Kalúz) together with the newly described female of *A. fendai* elucidated the main differences between *A. masani* and these species. Male *A. masani* **sp. nov.** differs from *A. fendai* **sp. nov.** by having five pairs of ventral setae (except for coxal, genital, anal and para-anal setae), sts formulae of coxae I–IV 3-1-3-2 and basifemora I–IV 5-5-3-0, and shorter dorsal setae f_1 (21) and h_1 (23), while the female of *A. fendai* **sp. nov.** has six pairs of ventral setae plus a pair of ventro-lateral simple setae between coxae II and III, sts formulae of coxae I–IV 3-2-3-3 and basifemora I–IV 5-5-4-2, and longer dorsal setae f_1 (31) and h_1 (41). *Armascirus masani* **sp. nov.** differs from the female of *A. cyaneus* by having five pairs of ventral setae, four spls on the palpal genu, shorter dorsal setae d_1 (12), e_1 (15), f_1 (21) and h_1 (23), while the female of *A. cyaneus* has six pairs of ventral setae, three spls on palpal genu and longer dorsal setae d_1 (17), e_1 (18), f_1 (31) and h_1 (34). *Armascirus masani* **sp. nov.** differs from *Armascirus cerris* by having five pairs of ventral setae, shorter dorsal setae f_1 (21) and h_1 (23), and a smaller distance between the bases of ***sci-sci*** than c_1-c_1, while female *A. cerris* has a six pairs of ventral setae, longer dorsal setae f_1 (31) and h_1 (34), a greater distance between ***sci-sci*** than c_1-c_1, and a different sts formulae on the coxae and basifemora.

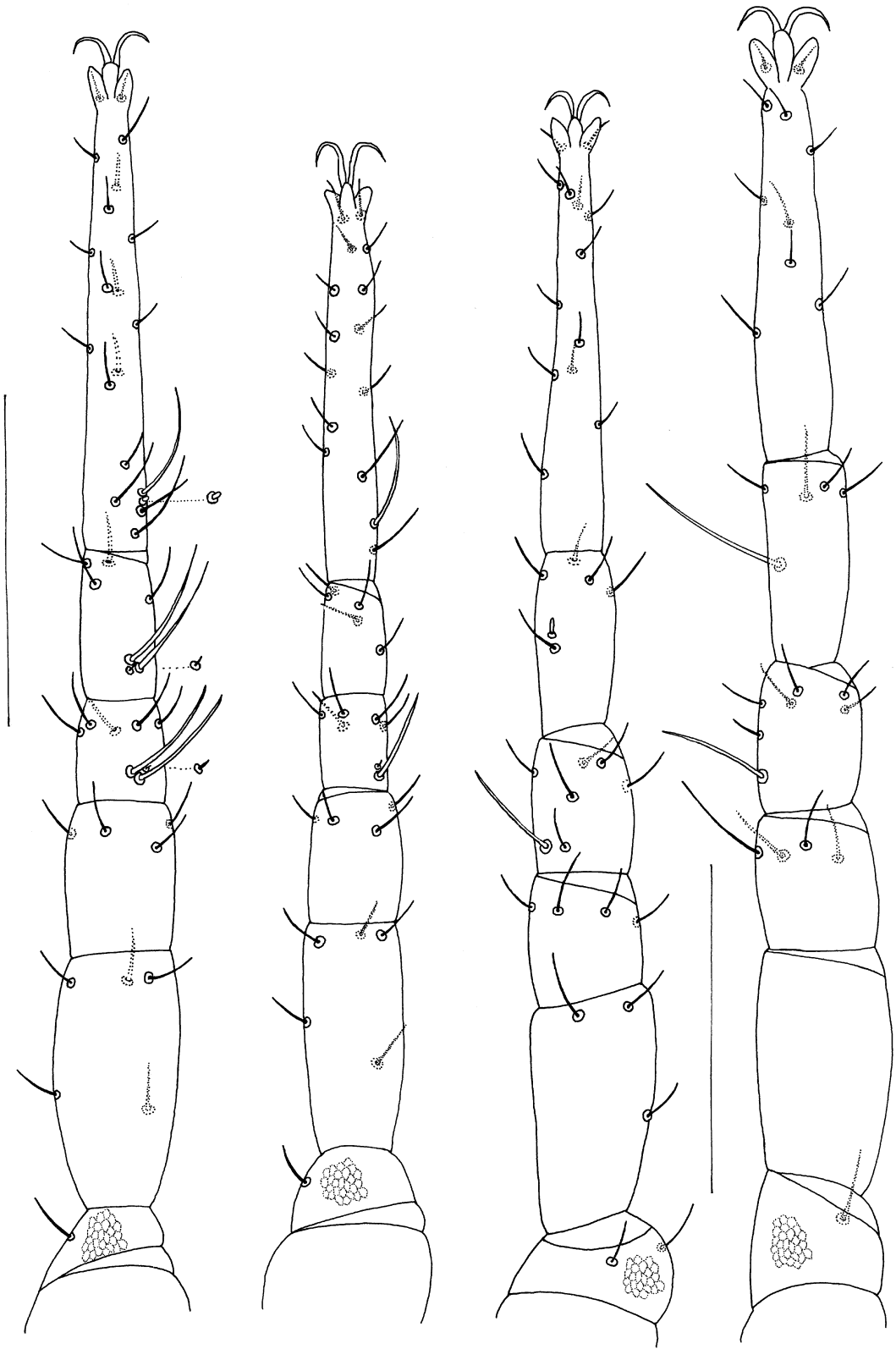

FIGURE 8. *Armascirus masani* **sp. nov.**—male; legs I–IV (from left, dorsal view). Scale bar = 100 µm.

Keys to the known species of the genus *Armascirus* (females, males)

The key to females is based on the key structure and taxonomic features presented in the key of Skvarla & Dowling (2011). The following species described by Den Heyer & Castro (2012) in addition to those newly described in this paper are included: *Armascirus braziliensis* and *A. bahiaensis.* On the base of generic diagnostics given by Den Heyer & Castro (2008a) and Skvarla & Dowling (2011) another species *A. bakeri* (Smiley 1992) formerly placed into the genus *Dactyloscirus* has been included into the genus *Armascirus*. The majority of keys are based on females, but we decided to a key to males, which have a large hysterosomal shield complemented with five pairs of setae (c_1, c_2, d_1, e_1,f_1). This feature is considered atypical for armascirine females and more characteristic for males (Skvarla & Dowling 2011). The structure of this key, together with the choice of diagnostic features, allows us to include *A. ebrius* (which is probably a male) among other known *Armascirus* species presented in this key.

Key to the females of *Armascirus*

1(2) Hysterosomal median shield present. 2
- Hysterosomal median shield absent 30
2(1) Hysterosomal median shield small or large, complemented with setae 3
- Hysterosomal median shield small, not complemented with setae. 23
3(2) One pair of setae (d_1) on hysterosomal median shield 4
- Two or more pairs of setae on hysterosomal median shield.. 20
4(3) Lateral hysterosomal platelets present 5
- Lateral hysterosomal platelets absent 17
5(4) Setae c_1 very short, the distance between the bases of c_1–c_1 20 times the length of c_1; venter caudally from coxae II with 5 pairs of simple setae (excluding genital, coxal and anal setae) . . . . . *A. rafalskii* Michocka
- Setae c_1 longer, the distance between the bases of c_1–c_1 less than 10 times the length of c_1; venter caudally from coxae II with other number of pairs (not 5) of simple setae (excluding genital, coxal and anal setae) 6
6(5) Venter caudally from coxae II with 4 pairs of simple setae (excluding genital, coxal and anal setae), hysterosomal median shield nearly quadrate, coxal formula I–IV 3-2-3-2 sts, palpal genu with 1 apophysis and 3 spine-like setae. . . . . .*A. bahiaensis* Den Heter & Castro
- Venter caudally from coxae II with 6 or more pairs of simple setae (excluding genital, coxal and anal setae). 7
7(6) The distance between caudal parts of hysterosomal lateral platelets wider than the distance between their frontal parts. 8
- The distance between caudal parts or hysterosomal lateral platelets shorter than the distance between their frontal parts. 10
8(7) Lateral hysterosomal platelets equal to or longer than hysterosomal median shield; venter caudally from coxae II with 6 pairs of simple setae (excluding genital, coxal and anal setae) . . . . . *A. jasmine* Bashir, Afzal & Khan
- Lateral hysterosomal platelets shorter than hysterosomal median shield; venter caudally from coxae II with 7 pairs of simple setae (excluding genital, coxal and anal setae). 9
9(8) Palpal genua with 3 spls, 1 sts. . . . . .*A. akhtari* Bashir, Afzal & Khan
- Palpal genua with 3 spls . . . . . *A. satianaensis* Bashir, Afzal & Khan
10(7) Venter caudally from coxae II with 7–8 pairs of simple setae (excluding genital, coxal and anal setae). 11
- Venter caudally from coxae II with 6 pairs of simple setae (excluding genital, coxal and anal setae). 13
11(10) Venter caudally from coxae II with 8 pairs of setae (excluding genital, coxal and anal setae), apophyses adjoining palpal genua shorter than genu; median shield truncated caudally; tarsal chaetotaxy I–IV 25-23-23-21 sts . . . . . *A. albiziae* Den Heyer
- Venter caudally from coxae II with 7 pairs of setae (excluding genital, coxal and anal setae). 12
12(11) Apophyses adjoining palpal genua longer than genu; median shield pointed caudally; venter caudally from coxae II with 7 pairs of setae; tarsal chaetotaxy I–IV 18-15-13-12 sts . . . . . *A. asghari* Bashir & Afzal
- Apophyses adjoining palpal genua as long as genu; median shield not pointed caudally; venter caudally from coxae II with 7 pairs of setae; tarsal chaetotaxy I–IV 24-24-22-21 sts . . . . . *A. brasiliensis* Den Heyer & Castro
13(10) Tarsus I with more than 27 setae: tarsus II with at least 24 setae.. 14
- Tarsus I with less than 25 setae: tarsus II with less than 23 setae. 15
14(13) Genital valve with random dot-like lobes; tarsal sts chaetotaxy I–IV 29-25-23-22 . . . . . *A. pluri* Muhammad & Chardhri
- Genital valve with longitudinal rows of dot-like lobes; tarsal sts chaetotaxy I–IV 29-24-22-21. . . . . *A. mactator* Den Heyer
15(13) Palpal telofemur with 1 apophysis, 2 spls; palpal genu with 1 ap, 2 spls, 2 sts. . . . . .*A. huyssteeni* Den Heter
- Palpal telofemur with 1 apophysis, 1 spls; palpal genu with 1 ap, 3 spls, 1 sts 16
16(15) Genu II with 1 asl, 5 sts; genu IV with 2 asl, 5 sts . . . . . *A. taurus* (Kramer)
- Genu II with 2 asl, 5 sts; genu IV with 1 asl, 4 sts . . . . . *A. primigenius* Skvarla & Dowling
17(4) Hysterosomal median shield with a straight or concave frontal margin and with very acute anterior lateral corners (angle less than 45°) 18
- Hysterosomal median shield with convex frontal margin and with rounded anterior lateral corners. 19
18(17) Palpal genu with 1 ap, 2 spls, 1 sts; legs I–IV sts formulae (excluding solenidia): basifemora 1-2-1-0; telofemora 4-4-4-4,

genua 6-7-5-6; h_1 4 times the length of c_1; hysterosomal shied width/length = 2.2/1 ..... *A. sabrii* Bashir, Afzal & Khan

- Palpal genu with 1 ap, 3 spls, 1 sts; legs I–IV sts formulae (excluding solenidia): basifemora 2-2-1-1; telofemora 4-4-4-3, genua 8-6-6-6; h_1 3 times the length of c_1; hysterosomal shied width/length = 1.5/1 ..... *A. gorjaensis* Bashir, Afzal & Khan

19(17) Apophysis adjoining genu and tibiotarsus shorter than palpal tibiotarsus; telofemoral palpal apophyses three times longer than spine-like seta; distance between the bases of *mps*—*mps* 9 times the length of *mps* ..... *A. bison* (Berlese)

- Apophysis adjoining genu and tibiotarsus longer than palpal tibiotarsus; palpal telofemoral apophyses three times longer than spine-like seta; distance between the bases of *mps*—*mps* 5 times the length of *mps* ..... *A. fixus* (Chaudhri)

20(3) Hysterosomal median shield with 2 pairs of setae (c_1, d_1) 21

- Hysterosomal median shield with 3 pairs of setae, (c_1, d_1, e_1); apophysis adjacent to palpal genu and tibiotarsus absent 22

21(20) Palpal telofemur with 2 ap, 1 spls; palpal genu with 2 spls, 2 sts; venter caudally from coxae II with 6 pairs of simple setae (excluding genital, coxal and anal setae); tarsi I–IV with 21-20-15-13 sts (excluding solenidia); the distance between bases of c_1–c_1 4 times the distance of h_1–h_1; distance between c_1–c_1 5 times the length of c_1 ..... *A. anastosi* Smiley

- Palpal telofemur with 1 ap, 1 spls; palpal genu with 3 spls, 1 sts; venter caudally from coxae II with 5 pairs of simple setae (excluding genital, coxal and anal setae); tarsi I–IV with 19-13-13-13 sts (excluding solenidia); the distance between c_1–c_1 2 times the distance of h_1–h_1; the distance between c_1–c_1 4 times the length of c_1 ..... *A. heryfordi* Smiley

22(20) 5 pairs of genital setae; palp claw bifid; hysterosomal setae not serrate ..... *A. apoensis* Corpuz-Raros

- 4 pairs of genital setae; palp claw entire, not bifid; hysterosomal setae serrate ..... *A. fuscus* (Chaudhri)

23(2) Lateral hysterosomal platelets present 24

- Lateral hysterosomal platelets absent 27

24(23) Width/length of hysterosomal median shield 1/1 25

- Width/length of hysterosomal median shield 2/1 26

25(24) Hysterosomal platelets large, as long as median shield; venter caudally from coxae II with 7 pairs of sts (excluding genital and anal setae); palpal telofemur with 1 apophysis ..... *A. cerris* Kalúz

- Hysterosomal platelets ca 1/3 the length of median shield; venter caudally from coxae II with 6 pairs of sts (excluding genital and anal setae); palpal telofemur with 2 apophyses ..... *A. fendai* **sp. nov.**

26(24) Hysterosomal platelets large, as long as median shield; venter caudally from coxae II with 6 pairs of sts (excluding genital and anal setae); genital setae g_3 & g_4 ca 1.3 times longer than g_1 & g_2 ..... *A. ozarkensis* Skvarla & Dowling

- Hysterosomal platelets small, ½ as long as median shield; venter caudally from coxae II with 6 pairs of sts (excluding genital and anal setae); genital setae g_3 & g_4 ca 1.3 times longer than g_1 & $g2$ ..... *A. gimpeli* Smiley

27(23) Apophysis on palp telofemur extends to distal margin of segment; 2 pairs of ventral pregenital setae thickened and spiculate; f_1 1/3 length of h_1 ..... *A. makilingensis* Corpuz-Raros

- Apophysis on palp telofemur extends well beyond distal margin of segment; ventral pregenital setae not thickened and spiculate; f_1 1/3 subequal to h_1 28

28(27) Palp telofemur with 2 ap, 1 spls; the distance between the bases of c_1–c_1 two times the distance of d_1–d_1 ..... *A. limpopoensis* Den Heyer

- Palp telofemur with 1 ap, 1 spls; the distance between the bases of c_1–c_1 = d_1–d_1 29

29(28) Palp tibiotarsus with 1 spls, 4 sts ..... *A. harrisoni* Smiley

- Palp tibiotarsus with 1 spls, 3 sts ..... *A. bakeri* (Smiley)

30(1) Palpal telofemoral apophyses long, reaching apical apophysis on palpal genu; lateral hysterosomal platelets present 31

- Palpal telofemoral apophyses short, not reaching apical apophysis on palpal genu; lateral hysterosomal platelets present or absent 32

31(30) Palpal basifemora with 1 subrectangular apophysis; palp tibiotarsal spls 3 times the length of terminal claw; hysterosomal platelets small, equal in length to c_2; coxal chaetotaxy I–V 3-2-3-3 ..... *A. lebowensis* Den Heyer

- Palpal basifemur without subrectangular apophysis; palp tibiotarsal spls equal in length to terminal claw; hysterosomal platelets long, 2–3 times the length of c_2; coxal chaetotaxy I–V 3-1-3-1 sts ..... *A. campbelli* (Smiley)

32(30) Coxal chaetotaxy I–IV 3-2-3-3 sts 33

- Coxal chaetotaxy I–IV 3-2-3-2 sts 35

33(32) Palpal telofemur with 1 apophysis, 2 spls, 1 sts; the distance between d_1–d_1 9 times the length of d_1; palpal genu with 2 spls, 1 sts ..... *A. cyaneus* Kalúz

- Palpal telofemur with 1 apophysis, 2 spls; the distance between d_1–d_1 4 times the length of d_1; palpal genu chaetotaxy not as above 34

34(33) Hysterosomal platelets present; palpal genu with 2 spls, 2 sts; basifemora I–IV with 5-5-4-2 sts ..... *A. virginiensis* Smiley

- Hysterosomal platelets absent; palpal genu with 1 spls, 1 sts; basifemora I–IV with 6-6-4-2 sts ..... *A. javanus* Corpuz-Raros & Gruezo

35(32) Palpal telofemoral apophyses as long as width of telofemora; palpal genu with 2 spls, 1 apophysis, 2 sts ..... *A. pennsylvanicus* Skvarla & Dowling

- Palpal telofemoral apophyses only 1/3 width of telofemora; palpal genu with 1 apophysis, 3 spls, 1 sts ..... *A. garciai* Corpuz-Raros

Key to the males of *Armascirus*

1(2) Venter with 5 or less pairs of setae except for genital, anal and adanal setae. 2
- Venter with 6 pairs of setae except for genital, anal and adanal setae. Setal formula of legs I–IV: coxae 3-2-3-3, basifemora 5-5-4-2 . . . . . *A. taurus* (Kramer)
2(1) Setal formula of legs I–IV: basifemora 5-5-4-1 and tarsi 20-22-14-15 sts . . . . . *A. ebrius* (Chaudhri)
- Setal formula of basifemora and tarsi I–IV otherwise 3
3(2) Coxal setal formula I–IV 3-1-3-3 sts. 4
- Setal formulae I–IV: coxae 3-2-3-3, tarsi I–IV 16-18-18-17(16) sts; papillae on circular region anterior to setae *sci* present . . . . . *A. huyssteeni* Den Heyer
4(3) Setal formula of legs I–IV: basifemora 5-4-3-0; tarsi 16-18-18-17(16) sts; papillae present on circular region anterior to setae *sci*. . . . . *A. limpopoensis* Den Heyer
- Setal formula of basifemora I–IV 5-5-3-0; papillae on circular region anterior to setae *sci* absent 5
5(4) Genu I—[2 asl, 1 sts], 2 asl, 4 sts; setal formula of tarsi I–IV 16-18-18-17 sts. . . . . *A. lebowensis* Den Heyer
- Genu I—2 asl, mst, 5 sts; setal formula of tarsi I–IV 16-13-12-10 sts . . . . . *A. masani* **sp. nov.**

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